DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the deciding method of a radio transmission system and the directive direction of an antenna. It is related with the communications system which performs automatically setting out of the antenna direction for performing especially wireless transfer.

[0002]

[Description of the Prior Art]Conventionally, a wireless interface is given to each terminal unit and the network system (wireless LAN) using a radio frequency is proposed.

[0003]In particular, to the demand of the latest high-speed broadband wireless communication, a very high radio frequency is used like JP,H5-304526,A, and the thing of the simple transmission and reception system is proposed. The base station provided with the antenna 801 which fully has the radiation characteristic of a wide angle which was attached to Hitoshi Amai's high position in JP,H5-304526,A as shown in drawing 8, and was turned caudad, It is laid in the lower position of a desk etc., and the network of premises is constituted by said parent transmitter-receiver and the terminal station 803 of the arbitrary number which performs exchange of data, and the terminal station 803, It had the antenna 804 which has the radiation characteristic 808 of an enough narrow angle, and while, the layer containing the substance 802 which absorbs the electric wave of the using frequency belt concerned is prepared for above-mentioned Hitoshi Amai.

[0004]When this composition is turned [the antenna 804 of a terminal station] in the base station antenna 801 direction, in order that the wave absorber 802 around a base station antenna may interfere and the back-scattering 806 may be absorbed, For a cordless handset, since the interference 807 by multipasses other than electric wave 805 from a main phone antenna, etc. is removed altogether, interference and a multipass are reduced extremely and

are excellent.

[0005]

[Problem(s) to be Solved by the Invention]However, in the above-mentioned composition, although the transmitter-receiver machine is simple, the antenna 801 and the still bigger wave absorber 802 must be installed in the center of a ceiling. Only a terminal, a position to the position which a direct wave reaches, i.e., the position of a prospect, of the antenna 801, will be able to be transmitted and received, and installation will be limited to the room with a very high ceiling, etc.

[0006]In order that it may reflect by a fluorescent light etc. and a multipass wave may come into a terminal station antenna, even if an antenna cannot be installed in the center of the room but it installs if there are lights, such as a fluorescent light, in the center of the room in using in an ordinary home, There was a problem of the wave absorber 802 stopping fully functioning.

[0007]In the not less than 10-GHz radio especially in very high frequency, such as a not less than 30-GHz millimetric wave band. A small directional antenna can create comparatively easily, since the tracking of an electric wave is also good, by using a directional antenna for transmission, antenna gain is made to increase and output power can be reduced. The electric wave to an unnecessary direction is made to the minimum by that cause, and interference and a multipass can be reduced. and the result compensated with attenuation of the signal foresee using reflection of the electric wave in structures, such as a building (a wall, a ceiling, a floor) and furniture, and outside communication is also possible in this case, and according to reflection with the directional antenna of high antenna gain and collapsibility -- it is desirable.

[0008]However, the thing for which a directional antenna is used for transmission, Since the communication itself may not be realized when an antenna direction is unsuitable at an initial state, it made it very difficult to set up the radio-wave-propagation course between receivers, and indirectivity or an antenna with a large radiation angle was to be used like conventional technology.

[0009]The purpose of this invention makes unnecessary installation of the antenna of the center of a ceiling, and a huge wave absorber, and there is in providing the radio transmission system which can set up a radio-wave-propagation course easily. It is in providing the radio transmission system which can set up an electromagnetic-wave-propagation course easily, using a directional antenna for transmission.

[0010]

[Means for Solving the Problem]In a radio transmission system with which a radio transmission system of this invention (Claim 1) mainly consists of a transmitter and a receiver, It has the 2nd means of communication that transmits a signal for determining the directive direction of the 1st means of communication and a transmission antenna which carries out wireless transfer between transmitter-receivers, and said 2nd means of communication differs from said 1st

means of communication.

[0011]As for information and telecommunications accompanying setting out of an antenna direction, it is preferred to use different means of communication which have extremely little amount of information to original communication and in which positive communication is possible to original information content. It is effective when choosing the directive direction of an antenna automatically especially.

[0012]This method has the high tracking of an electric wave, and since it is preferred to use frequency which a directional antenna is small and tends to make, using above 10 GHz is preferred. If attenuation in the air and attenuation by reflection use rather more preferably on frequency which is 30 GHz - 90 GHz of a large millimetric wave band, communication failure by interference with an other station or a multipass can be prevented, and a more stable communications system can be built.

[0013]It can be considered as a system which is easier to use as information other than the directive direction by choosing a communicative start, finish information (ON of a power supply, OFF), a communication channel (frequency, TDMA, CDMA ****), a communication content, etc. by the 2nd communication. It especially makes it possible for a transmitter and both receiver to cooperate and to control a power supply by the 2nd communication especially, when the 1st wireless transfer is one way communication etc., and an effect is high.

[0014]Either or those combination are used for a radio transmission system of this invention (Claim 2) as said 2nd means of communication among power line communication, optical communications, sound wave communication, or radio from which said 1st means of communication and frequency differ.

[0015]In the case of power line communication, power line communication is the method of making an electrical signal superimpose on a power line of home 100V grade, and communicating. Since a transmission system and a receiver have taken a power supply fundamentally, mutual communication is almost certainly possible. a field, for example, a neighboring house from each home, to make it reveal power line communication -- or when performing separation on every floor in a building etc., since a signal can be easily intercepted by attaching a band filter to a power line, it is suitable for a system which limits and uses places, such as wireless LAN.

[0016]In the case of optical communications, in a room, it reflects at a wall and the ceiling and can communicate all over the districts mostly in the usual house. It is infrared ray communication more preferably.

[0017]In sound wave communication, in a room of the usual house, it can communicate all over the districts mostly. It is an ultrasonic wave more preferably. In the case of a sound wave, there is the strong point in which cover area is larger than optical communications.

[0018]When it is the radio from which frequency differs, radio wave propagation changes a lot

because frequency differs, and it foresees on frequency of the 1st communication, and an electric wave can turn to an outer field. Frequency of 3 GHz or less which can communicate by a room and building units more preferably that there is almost no obstacle is preferred, and not less than 500-Hz the frequency of 2.5 GHz or less is [that an electric wave does not fly too much to a distance more preferably] preferred. Specifically, communication between specific small power communication, a cordless telephone, and PHS main phone cordless handsets, etc. are preferred. If communication between main phone cordless handsets, such as a cordless telephone, is used, there is no interference with the same system that adjoins since interference evasion and unknown episode nature are already secured, and it is desirable.

[0019]In the case of two or more of those combination, a complement of mutual cover area can be performed. A case where especially power line communication and other radio are combined is good. It is because a portable device which is not connected to a power line on radio can be covered in addition to the certainty of a cable.

[0020]A radio transmission system of this invention (Claim 3) has a means to have a means to change the directive direction of a transmission antenna automatically, and to measure either among receiving intensity of a receiver, an interference situation, and a multipass at least, and to determine the direction of a transmission antenna.

[0021]Determination of a transmission antenna changes the directive direction of a transmission antenna one by one automatically, and becomes by evaluating the occasional receiving condition. Although evaluation of a receiving condition can be performed by choosing a direction with strong receiving intensity most simply, it is more preferred to choose a communication path without interference and a multipass further.

[0022]In that case, it is also effective to shorten averaging time by evaluating interference and a multipass by receiving intensity after evaluation.

[0023]Even if judgment which determines the directive direction of a transmission antenna eventually may communicate to the transmitting side by the 2nd communication, may perform quality of a receiver at the transmitting side, and transmits a directive angle from the transmitting side and it performs it by a receiver, it is possible. When the directive direction of a transmission antenna is judged by a receiver, setting out of an antenna direction will be eventually directed to the transmitting side.

[0024]It is also effective in time reduction of evaluation to change an angle one by one, to evaluate it coarsely, and to evaluate a good point finely. A sending signal at this time can be made not to become other reception interference by using different channels (frequency, CDMA, TDMA) from a transmission content.

[0025]A radio transmission system of this invention (Claim 4) has two or more transmission antennas with which a transmitter contains both the 1st indirectional or directive low antenna and the 2nd directive high antenna, and transmits to two or more receivers simultaneously

using the 1st antenna.

[0026]Since the indirectional or directive low antenna can cover many terminal stations at once, a propagation path of a prospect can be simultaneously provided to each terminal in a prospect position. Therefore, the number of directive high transmission antennas can be reduced. In this case, in order to reduce a multipass by an electric wave from a directive low antenna, and interference, it is more desirable than a directive high antenna to reduce a transmission output.

[0027]A deciding method of the directive direction of an antenna in a radio transmission system of this invention (Claim 5), A receiver has the 2nd directive high receiving antenna, and chooses the directive direction of the 2nd receiving antenna from the 1st indirectional or directive low receiving antenna and said 1st receiving antenna after choosing the directive direction of a transmission antenna using the 1st receiving antenna.

[0028]When a transmission antenna is a directional antenna, in order to have to evaluate receiving intensity, changing for [both] antennas if a receiving antenna also uses a directional antenna, setting out of a propagation path becomes more difficult.

[0029]Since a transmission antenna can be first set up by using an indirectional receiving antenna and the directive direction of an antenna of transmission and reception can be set up one side at a time by changing the directive direction of a receiving antenna after that, it becomes possible to evaluate the directive direction of a transmission antenna for a short time.

[0030]It is also possible to perform the 1st receiving antenna and 2nd receiving antenna using the same antenna that can change directivity.

[0031]the directive direction of a transmission antenna with a good deciding method of the directive direction of an antenna in a radio transmission system of this invention (Claim 6) -- the direction of plurality -- oh, Ecklonia memory is carried out and the directive direction of a transmission antenna is changed into one of said directions of plurality at the time of communication failure

[0032]A deciding method of the directive direction of an antenna in a radio transmission system of this invention (Claim 7), The directive direction of a good transmission antenna is beforehand prepared for a change which makes the direction of plurality memorize beforehand above with two or more transmission antennas, and it changes into a transmission antenna of a different direction at the time of communication failure.

[0033]A deciding method of the directive direction of an antenna in a radio transmission system of this invention (Claim 8), Radio disturbance of a desired receiver is canceled by fluctuating the number of transmission antennas which a transmitter has two or more transmission antennas, and assigns to a communication path with one receiver according to a grade of each radio disturbance in two or more receivers.

[0034]A transmission antenna can be assigned to a terminal which a receive state of each terminal station is by no means the same, and it is possible to reduce assignment of a transmission antenna of a base station to a terminal which hardly happens or radio disturbance is not encountered, and has much the part radio disturbance. It enables this to communicate with many terminals more certainly with the minimum number of transmission antennas.
[0035]At this time, what evaluated an overall evaluation which becomes by evaluating by radio field intensity, existence of interference, a grade of a multipass, etc. is used for radio disturbance.
[0036]weighting during the aforementioned judgment being set up with a terminal, or in actual employment, besides judging only by the aforementioned evaluation, since tolerance changes also with the contents and utilization objects of information which communicate, Construction of a communications system more stable by having composition which sets up weighting between terminals over said overall evaluation is possible.
[0037]
[Embodiment of the Invention]An embodiment of the invention is described in detail based on Drawings below.
(Embodiment 1) In the transmission and reception system of this invention, drawing 1 is a figure showing how to set up the directive direction of a transmission antenna, when there is an obstacle.
[0038]In drawing 1, there are the base station 102 with the directive antenna 101 for transmission installed within the enclosure of indoor and the terminal station 104 with the indirectional receiving antenna 103, and 1st communication 105 by radio is performed between the base station 102 and the terminal station 104.
[0039]As the 1st communication 105 by radio, the multi-channel image simultaneous transmissive communication by 60 GHz was performed. The whole zone was 2 GHz, using satellite broadcasting (about 300 channels which united BS broadcasting and CS broadcasting) as video information. Communication transmitted from the base station and was considered as 1 direction communication received by a terminal station.
[0040]Since the directional antenna near 60 GHz is small and it is hard to illustrate the direction with all the figures hereafter, it substitutes that the direction of a directional beam is shown simply for the graphic display of the direction of each antenna. In the case of the indirectional or directive low antenna, it has displayed temporarily in the shape of the rod antenna.
[0041]Actually, it comprises a horn antenna, a patch antenna (flat antenna), etc. A directive change of an antenna was made by changing an antenna's own angle with a stepping motor etc. The high thing of a directional antenna of antenna gain which has as narrow a radiation angle as possible is preferred.

[0042]For connection of the 1st wireless communications lines, the base station 102 needs to turn the directive direction of the transmission antenna 101 to an optimum direction. By drawing 1, the direction 106 of a prospect which is one of the optimum directions shows the situation currently intercepted with the obstacle 107 which does not penetrate an electric wave.

[0043]When performing communication with the base station 102 by the terminal station 104, A worker transmits the setpoint signal of the antenna directivity direction to the base station 102 with the ultrasonic wave 109 using the remote control unit 110, and the base station 102 sets up the antenna direction 112 according to it, and carries out test transmission in the frequency band of the 1st communication 105. The terminal station 104 measures and displays the radio receiving intensity of said communication 105 (or making test transmission into the video signal itself a reception picture display), and a worker evaluates the intensity (or image quality).

[0044]One by one, a worker repeats the above-mentioned method, carry out the directive direction of the transmission antenna 101 change 112, and in the case of the best antenna directivity direction and drawing 1, out of it, ****** and its antenna directivity direction are specified for the connection path 108 of the wireless communications lines using reflection with a ceiling and a wall as the base station 102, and the 1st communication is started. Even when there was an obstacle by the above method, the directive direction of the transmission antenna could be chosen easily, the communication path using reflection of a ceiling, a wall, furniture, etc. could be secured easily, and the radio of the broadband was possible.

[0045]Energy saving of the base station was possible for the remote control 110 by controlling the ON OFF of the power supply of a base station in addition to the direction of an antenna.

[0046]Although it is also possible to use an audible sound wave for the 2nd communication instead of an ultrasonic wave, since the ultrasonic wave of the time of communication is quieter, it is desirable. It is also possible to use light instead of a sound wave. In that case, since the time of the 2nd communication does not have visible infrared rays, it is desirable. It is also possible to use the electric wave of different frequency from the 1st communication for the 2nd communication further again. 110 of a figure and communication positive by using 111 as a communication apparatus with the cordless handset function of the cordless telephone were possible. In this case, a cordless telephone's own interference prevention and communication which interference of the 2nd communication with a neighboring house was prevented, and was stabilized more by the privacy function were completed.

The example which sets up automatically (Embodiment 2), next the directive direction of a transmission antenna is explained.

[0047]Drawing 2 shows how to set up automatically the directive direction of the transmission antenna 201 of the base station 202, supposing the base station 202 of the same situation as

drawing 1, and the terminal station 204.

[0048]Therefore, 201-209, and 211,212 in a figure support 101-109, and 111,112 of drawing 1. Communication information and communication frequency used the same thing as Embodiment 1.

[0049]The procedure of the 1st communication by radio and the 2nd communication by a sound wave is shown in drawing 3.

[0050]The terminal station 204 transmits the setpoint signal S1 of the antenna directivity direction with the ultrasonic wave 209 from the ultrasonic remote-control-transmission device 210, The ultrasonic remote control receiving set 211 receives, and the base station 202 sets up the direction of the antenna 201 according to it, and transmits the test signal S2 in the frequency band of the 1st communication 205. The terminal station 204 measures the radio receiving intensity of said communication 205.

[0051]The terminal station 204 memorizes multiple times and the receiving intensity which changes the directive direction of the transmission antenna 201 one by one repeatedly (S3 of drawing 3), and corresponds for the above-mentioned method, and is ******* about the strongest receiving intensity out of it. The terminal station 204 transmits signal S4 which specifies the directive direction and an information start as the base station 202.

[0052]Communication of the base station 202 is attained with the transmission antenna of the optimal directive direction by setting up in the directive direction which had the antenna 201 specified, and starting the 1st radio 205 (S5 of drawing 3).

[0053]An order of change of the directive direction of a transmission antenna gives a number in the direction which can be set up in order simply, and was made to carry out a sweep to a numerical order with directions of the terminal station. In this case, after measuring the receiving intensity of all the numbers, the desirable number was able to be eventually specified from the terminal station, and the antenna direction was able to be set up. When it was made for the signal from a terminal station to consist of biaxial angular data, the omnidirection was searched coarsely, the desirable direction was investigated more finely, the optimal directive direction could be set up, and shortening of time was possible at ** which can specify an angle free to a terminal station.

[0054]the power supply (this example -- the receiving antenna of satellite broadcasting.) of the sources of information of information and telecommunications of a base station it is also possible to direct the ON OFF of the power supply of a converter together with the signal of S1 from a terminal station -- that time -- selection of two or more sources of information, for example, CS broadcasting, and BS broadcasting -- or, Selection information, such as selection of the vertical polarization channel of CS broadcasting and a vertical polarization channel, can be transmitted, and it can also be considered as the system which is easier to use by choosing the transmit information according to it in a base station.

[0055]When the 1st communication is completed, if the signal S6 which directs the end of the communication to a base station is transmitted and other terminal stations are not using the information in a base station, it is also possible to build the system of energy saving by turning off the sources of information.

[0056]Although 2nd communication was considered as communication of one way from the terminal 204 to the base station 202 in this example, It is considered as Aikata-oriented communication and the determination of the antenna directivity direction more stable by transmitting information, including the signal of completion of change of the directive direction of an antenna, the range of the antenna direction which can be taken, etc., to a terminal station is attained.

(Embodiment 3), next a terminal unit explain the example of a two-set ** case.

[0057]An example although the number of those with two set (401, 402) and the base stations 403 is [a terminal unit] one, in case it has two or more antennas is shown in drawing 4 (a).

[0058]Communication information, communication frequency, and the 2nd correspondence procedure used the same thing as Embodiment 1. The terminal unit 401,402 makes multiple selection of the candidate of the desirable direction of directive transmission antenna 404 a-e of the base station 403 by the same method (S1 of drawing 3, S2, S3) as Embodiment 1. The 2nd communication is not illustrated.

[0059]When a receive state is comparatively bad (the terminal unit 401 hits this in this figure), two or more transmission antenna 404 a-c is set as the candidate of the different directive direction, and it communicates by one 404a in it (S4 of drawing 3, S5).

[0060]And when a communication path was intercepted, the directions (S7 of drawing 3) changed to a different transmission antenna were taken out from the terminal 401 to the base station 403, and the base station 403 has prevented communicative interception by changing and transmitting to the transmission antenna set as the candidate of the different directive direction (S8 of drawing 3).

[0061]When a receive state is comparatively good (for example, when there is nothing of a base station that is interrupted mostly just under) in this figure, the terminal unit 402 hits this -- communicative interception was able to be made into the minimum by changing and corresponding to another candidate 404e who memorized the directivity of the antenna, when a radio course is secured by one of the transmission antenna 404d and the worst course intercepts.

[0062]It is effective to prepare for interception of the following radio-wave-propagation course in that case, and to make it increase the number of assignment of an antenna. It specifically removes from assignment to the terminal station 401 of the antenna of 404c, It can be considered as assignment to the terminal station 402, and can be considered as the same direction as 404e (when 404 d has turned to the direction of 404e, it is the 404-d direction of

origin), and communicative interception can be prevented by changing an antenna immediately at the time of interception of a next radio-wave-propagation course.

[0063]Which secures an antenna to each terminal in that case. A base station is able to transmit to a base station and to judge the receive state from a terminal station, the method which a base station fluctuates according to the change frequency of an antenna is also possible, and it is also possible to adjust between [401 and 402] terminals depending on a correspondence procedure, and to make it fluctuate.

[0064]Since the terminal station of all the directions can be used if it has the indirectional antenna 405 in the base station 403 one set, the required number of antennas of the base station 403 can be reduced. In the case of drawing 4, the directional antennas 404a and 404d currently used for communication by the direct wave of each terminal can be reduced, and more stable communication can be performed by distributing a ******** antenna to another course. In that case, since the indirectional antenna 405 emits an electric wave in all the directions, it needs to output less than directional antenna 404 a-d so that interference and a multipass may be made increased.

[0065]The notional relation of the relation between the antenna directivity angle of a transmission antenna and the receiving intensity of a receiver is shown in drawing 4 (b). Receiving intensity serves as the maximum in the direction of P1 here, and the maximal value which is different by P3 is taken. In this case, it becomes the 1st candidate of the direction which P1 direction chooses. It is more desirable to be referred to as P3 although the 2nd candidate has the receiving intensity of the direction of P2 larger than the receiving intensity of the direction of P3, for example. It is because this has a high possibility of being intercepted simultaneously when P1 and P2 are spread in the almost same course and a course intercepts by movement of people etc. Therefore, it is preferred to choose in an order from the different maximal value which the angle left as much as possible as a candidate of the different directive direction. Although the vertical axis of drawing 4 (b) was explained as receiving intensity of a receiver, it is possible to perform interference and communication which was stabilized more by choosing the candidate of the directive direction of a transmission antenna by the above-mentioned method as evaluation taken into consideration as for the multipass obstacle.

(Embodiment 4) In the transmission and reception system of this invention, the example which performs 2nd communication for determining transmission antenna directivity with a power line is explained using drawing 5.

[0066]In drawing 5 (a), there are the base station 502 with the directive antenna 501 for transmission installed within the enclosure of indoor and the terminal station 504 with the directive receiving antenna 513, and 1st communication by radio is performed between the base station 502 and the terminal station 504.

[0067]Communication information and communication frequency used the same thing as Embodiment 1.
[0068]In this figure, the communication for determining transmission antenna directivity is performing communication 509 from the power line communication sending set 510 of the terminal station to the power line communication receiving set 511 of the base station via the power line (home 100V power supply) 515.
[0069]The band filter 516 is installed so that the signal of the 2nd communication using a power line may not be revealed through a power line to the exterior (outside of the outdoors).
[0070]Since the receiving antenna 513 is directivity, all the directions of the receiving antenna 513 are carried out 514 scanning every directive direction change 512 of the transmission antenna 501, and the directive angle and receiving intensity of a case of the highest receiving intensity are memorized. And it was made to set up in the directive direction to which the transmission antenna directivity direction with the largest receiving intensity is transmitted to the base station 502 in it after a check, and the receiving antenna 513 corresponds all the directions of the transmission antenna 501, respectively.
[0071]Here, since the direct wave 506 is covered by the obstacle 507 like Embodiments 1 and 2, the state where the reflected wave 508 is the optimal is shown.
[0072]Use the indirectional or directive weak antenna 503 for a receiver separately, and the indirectional antenna 503 estimates to the change which all scans receiving antenna 513 direction for every direction change by evaluating the intensity of the transmission antenna 501, After choosing the candidate of the optimal direction of a transmission antenna, the set period of an antenna direction can be shortened with scanning the direction of the receiving antenna 513.
[0073]When the receive state of a receiving antenna of the indirectional antenna 503 is good, the communications system which could increase the course and was stabilized more by using it as one of the radio courses like the directive antenna 513 is possible.
[0074]In this example, although the 1st communication explains the one way communication from a base station to a terminal station, it can apply also to the communication for Aikata and can serve as a directive receiving antenna in that case. Or it is also possible to make transmission and reception into another course.
[0075]Another embodiment of the terminal station is shown in drawing 5 (b). The terminal units 504 are general electronic equipment (television etc.), and 517 is the power source wire and aerial wire. put [sending set / the power line communication sending set 510 supervises the power supply of the terminal unit 504, and / when put into the power supply of the terminal unit 504 / automatically / into the antenna unit 518 / a power supply] Make, it begins to set up the antenna directivity direction of a base station here. Since general electronic equipment is connectable as it is if it is a terminal station by this composition, television for exclusive use

etc. are unnecessary and it is possible to constitute a system from a low price.

[0076]Another embodiment of the terminal station is shown in drawing 6 (a). The terminal unit 612 is a portable device and is not connected to the power line. The situation except only the number of terminal equipments (in this case, two pieces) having the transmission antenna 601 in the base station is the same as drawing 5 (a). The terminal equipment 621 transmitted the antenna directivity direction setpoint signal with the infrared-remote-control sending set 623, in order to determine the direction of the transmission antenna 601 of the base station 602, and the translator 620 receives infrared remote control signals, changes them into the power line communication signal 609, and it transmitted it to the power line communication receiving set. The apparatus which is not connected to the power line was also able to be used by this composition.

[0077]Also in the state where it installed near the ceiling of the room, and in a wall surface, infrared ray communication and the power line communication translator 620 are possible, and, The infrared ray communication section 632, the power line communication part 631, and the receptacle plug 633 are made into integral-type shape like drawing 6 (b), It is possible to reduce the execution cost of equipment by enabling it to use for the home 100V electric socket 634, carrying to each part store in accordance with movement of the portable device 604, and inserting. Although infrared rays were used, the radio from which a sound wave, light, and the 1st communication and frequency differ is possible, and especially the gestalt of drawing 6 (b) is possible at drawing 6 (a) and (b) as a translator when radio and power line communication are used for the 2nd communication.

The change of (Embodiment 5), next the transmitting antennas of this invention is explained using drawing 7. In those with two set (701, 702), and the base station 703, there is a terminal unit in drawing 7. Communication information and communication frequency used the same thing as Embodiment 1. The 2nd communication is not illustrated.

[0078]The terminal units 701 and 702 are the same methods as Embodiment 4, and make multiple selection of the candidate of the desirable direction of transmission antenna 704 a-d of the base station 703, receiving antenna 707 a-c, and a 707-d desirable direction. If the indirectional antenna 706 of a terminal station is used, it is the same as Embodiment 3 that the antenna selection time of transmission and reception can be shortened.

[0079]The terminal unit 701 has secured the radio course by two or more antenna 705 a-c, receives using the good antenna 705a of a receive state in it, and if a receive state gets worse, it will be changed to another better antenna 705b and c.

[0080]In this case, although transmission is always performed from all the antenna 704 a-c and only the change of the receiving antenna 705 may be performed, The thing which is being done for normal use and which thing 704a Accept it, uses it, and changes the receiving antenna 705 and the transmission antenna 704 from a to b simultaneously at the time of the

change of a course is also possible for the transmission antenna 704. Since a base station does not take out the electric wave which does not need latter one, interference and a multipass obstacle can be decreased. Or only as for the fixed time of a change, it is overlapping and transmitting, and is effective in preventing cutting of communication by the time lag of a change of transmission and reception, and the transmission antennas 704a and 704b are **.

[0081]Thus, when a radio course is intercepted with the antenna of plurality [terminal station], it is able to enable it to use another antenna direction immediately. In that case, it can be performed which secures an antenna to each terminal as well as Embodiment 3, and by drawing 7, a base station is right under mostly, and the terminal 702 is not interrupted, and shows the state where one antenna is assigned. The antenna of the terminal stations 701 and 702 is illustrating only what was used for explanation, and may have an antenna of the number beyond this.

[0082]Since the terminal station of all the directions can be used if it has the indirectional antenna 706 in a base station one set, it is the same as that of Embodiment 3 that the required number of antennas of a base station can be reduced, but it is necessary to make a transmission output low enough similarly.

[0083]When the receive state of a receiving antenna of the indirectional antenna 707 is good, the communications system which could increase the course and was stabilized more by using it as a radio course like a directive antenna is possible.

[0084]Although the base station is giving the example for which transmission and a terminal station receive, if it constitutes conversely, a base station can make it reception and a terminal station can make transmission the above-mentioned Embodiments 1-5. Or it is possible to perform Aikata-oriented transmission and reception because a base station and a terminal station have both composition. In that case, it cannot be overemphasized that it is sharable by transmission and reception if the antenna is possible.

[0085]Although the example of satellite broadcasting was raised, there is no specification in particular, and the contents of radio are television (the information on a terrestrial wave, satellite broadcasting (BS broadcasting, CS broadcasting), radio, a home video, a surveillance video camera signal, a TV phone, etc. is possible, and it is **.). In communication of a broadband which transmits and receives especially the plurality of these information collectively, since it becomes difficult to secure the communication path by a diversity system etc. in each channel, especially the composition of this patent is effective.

[0086]Although the radio frequency gives a 60-GHz example, its tracking of an electric wave is actually high, and since it is preferred to use the frequency which a directional antenna is small and tends to make, not less than 10 GHz is preferred [the radio frequency]. If attenuation in the air and attenuation by reflection use rather more preferably on the frequency which is 30

GHz - 90 GHz of a large millimetric wave band, the communication failure by interference with an other station or a multipass can be prevented, and the more stable communications system can be built.

[0087]Although the terminal station in particular is not described in working example, it is electronic equipment corresponding to the above-mentioned communication content. By the above-mentioned composition, TV in which small carrying is possible can also secure a communication path certainly. Only when arrangement of the time of installation or the furniture of the room is changed for the above-mentioned antenna setting out at the terminal hardly moved like large-sized TV, it is using a deed and the usually memorized direction of a transmission antenna, and it is also possible to perform time reduction to a communication start.

[0088]When securing a communication path using two or more antennas, when one course is found, the 1st communication is started, and the time to the start of the 1st communication can be shortened by continuing the procedure of securing another course in parallel with it.

[0089]Drawing 1 and the obstacle of 2, 5, and 6 reflect an electric wave, and since wooden things serve as an obstacle by absorbing an electric wave above 30 GHz, as for a metallic thing, a locker, a bookshelf, etc. are equivalent to it in the partition of the room of a general home and an administration building, furniture, and an administration building.

[0090]In Embodiments 1, 2, and 3, an ultrasonic wave at Embodiments 4 and 5 power line carrier communication, Although the combination of power line communication and infrared ray communication was used as a correspondence procedure for cross connection, the sound wave of an auditory area may be used besides an ultrasonic wave, and the light of a visible region may be sufficient besides infrared rays at a part of Embodiment 4 (drawing 6 (a)). In addition, different radio from the frequency of the 1st communication, especially frequency are low, and propagation of an electric wave can use what has cover area larger than propagation of the 1st frequency. Since these communications are used for cross connection with this composition and transceiver capacity may be very small compared with the 1st communication, the composition in a very simple circuit is attained.

[0091]Since the direction of the certainty during transmission and reception becomes important rather, it is preferred to increase certainty because plurality combines. The positive communication using a wire communication is secured like especially power line communication, and since the portable apparatus which is not connected to the power line is covered, it is more preferred to combine the method by radio, such as the above-mentioned electric wave, light, and a sound wave. When using an electric wave, it is practical to use the frequency band of the communication between main phone cordless handsets of a cordless telephone, a PHS telephone, etc. as what can cover the enclosure of the room and a house, etc.

[0092]Although the example to which directions are taken out from a receiver and which a transmitter makes antenna setting out was given in the embodiment of the invention, In this method, it is also possible to include directions of a start of the communication procedure to a base station, and also in the case of the one-way communication according [ending by the one-way communication from a receiver and original radio] to the transmission from a base station, after setting up a communication path, there is an advantage which serves as those for Aikata with the minimum composition.

[0093]It is also possible to evaluate by the receiving intensity signal from a receiver, if it is only evaluation of a communication line, and a receiver will transmit receiving intensity and a transmitter will change the directive direction of an antenna, Since the time lag of antenna setting out can also take a transmitter into consideration, it is desirable, but since many terminal stations are at hand, there is also usually a fault which becomes Aikata-oriented communication for the directions to a base station.

[0094]Simply, it is possible to change the antenna direction of a directional antenna, and the direction variable by movement of a phased array antenna and the light reflector installed ahead [antenna] is possible for the directive method of a transmission antenna. When outputting the same signal of a super-broadband from two or more antennas especially, there is an advantage from which the way which branched the electric wave and changed the course with the light reflector can secure two or more courses easily rather than extending an antenna.

[0095]

[Effect of the Invention]According to the composition of Claim 1 or Claim 2, it is not dependent on the radio-wave-propagation characteristic of the 1st wireless transfer, and it becomes possible [constituting from an easy circuit cheaply] to choose the directive direction of an antenna and to secure a communication path.

[0096]According to the composition of Claim 3, employment of the communications system which could choose the desirable communication path and was stabilized is attained.

[0097]The number of directive high transmission antennas can be reduced by composition of Claim 4.

[0098]By according to the composition of Claim 5, a transmission antenna setting up first by using an indirectional receiving antenna, and changing the directive direction of a receiving antenna after that. Since the directive direction of the antenna of transmission and reception can be set up one side at a time, it becomes possible to evaluate the directive direction of a transmission antenna for a short time.

[0099]According to the composition of Claim 6, the method according to claim 3 or 4 estimates the directive direction of a transmission antenna, and change of the directive direction of a transmission antenna is attained by memorizing beforehand the directive direction with several

different good directions for a short time.

[0100]According to the composition of Claim 7, change of the directive direction of a transmission antenna is attained for a short time by setting up two or more transmission antennas in the directive direction with a beforehand different good direction.

[0101]According to the composition of Claim 8, it becomes possible to communicate with many terminals more certainly with the minimum number of transmission antennas.

[Translation done.]